WASHINGTON
SCIENCE TRENDS

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Vol. V, No. 10 November 21, 1960

* PARAWING DESIGN STUDIES

New studies by the National Aeronautics and Space Administration look favorably upon the use of the Parawing for take-off and landing by supersonic aircraft. Wind tunnel tests were conducted with Parawing-equipped models of a B-70 type aircraft.

\# The Problem -- NASA points out that low take-off and landing speeds of airplanes are desirable from many points of view. However, concentration on superior high-speed cruise design has generally resulted in high take-off and landing speeds, and has therefore made longer runways necessary.

\# A Suggested Solution -- One suggested solution is to provide a large increase in wing area for low-speed flight by the addition of an auxiliary flexible wing or Parawing. These are lightweight, stowable fabric wings of parachute-like construction. Earlier studies by NASA have indicated that such a wing could be successfully deployed from a package atop a fuselage and easily controlled by varying line lengths.

\# Parawing Construction -- Model Parawing frames were constructed of three aluminum tubes joined by a hinge or by springs. Fabrics tested included a nylon ripstop parachute cloth; a dacron sailcloth and a nonporous Mylar film bonded to a nylon ripstop parachute cloth. Parawings were attached to the model fuselage by nylon lines or steel cables.

Ø Test Results:

✓ Increased Lift -- The use of a Parawing which has an area twice the wing area of the B-70 type model resulted in a threefold increase in lift coefficient at an airplane attitude of 12°. There was no loss in Lift/Drag.

✓ Superior Lateral Characteristics -- In the B-70 Type model tests, stability was improved by adding the Parawing.

✓ Nonporous Fabric Preferred -- The use of nonporous fabric in the construction of the Parawings about doubled the lift-coefficient increment obtained with a Parawing constructed of parachute cloth.

(Exploratory studies reported by R. L. Naeseth, Langley Research Center, National Aeronautics and Space Administration, Langley Field, Va.)

* AIR FORCE PRIORITIES: Here is the latest list --

✓ Intercontinental Ballistic Missiles
✓ Air-to Surface Missiles
✓ Follow-on Long-range Aircraft
✓ Advanced Tactical Systems
✓ Ballistic Missile Warning Systems
✓ Long-range Defenses
✓ Modern Communications Network
✓ Advanced Reconnaissance Systems
✓ Modernized Cargo Fleet
✓ Advanced Manned Space Systems

* INFLATABLE AIRCRAFT

The U. S. Navy is reported to be considering a vertical and short take-off and landing (V/STOL) version of the Wagmight inflated aircraft. (For details see SCIENCE TRENDS, December 14, 1959.)

Key to the new configuration is a device capable of storing and releasing excess quantities of compressed air. This air, resulting from normal engine operation, is employed to rotate twin wing-mounted turbo fans. This additional lift for peak power is combined with a cambered neoprene-coated fabric wing to provide ascent.

Studies indicate that in 7.3 seconds such an aircraft could reach an altitude of 80 feet in 30 feet of forward flight. In a proposed light logistics transport the aircraft would employ two T-64 turboprop engines; would have a gross weight of 15,000 pounds with a 3,000 pound payload. Range is considered to be 450 nautical miles, with a speed of 325 knots.

* AEC UNIVERSITY PLANS

Atomic Energy Commission officials indicated to members of the American Association of Land-Grant Colleges during the past week that new plans are being considered for AEC aid to educational institutions.

✓ Nuclear Laboratory Equipment -- AEC equipment grants currently go to engineering institutions. In the future, according to AEC official John C. Cera, grants will also be made to colleges of arts and sciences for equipment useful in general nuclear studies. This will aid institutions which have not previously benefited, as well as increasing marketing opportunities for manufacturers. Such equipment will include particle detection devices, pulse height analyzers, subcritical assemblies and neutron sources.

✓ Both undergraduate and graduate laboratories will be assisted in this program. AEC will require that the equipment be used "primarily" for teaching as distinguished from research, though they may frequently serve both purposes.

✓ Teaching Reactors -- The AEC will no longer make grants for teaching reactors but will continue to lend nuclear materials for fuel and start-up sources without charge, and provide assistance for chemical reprocessing of the spent fuel elements for university teaching and research reactors through June 30, 1964.

Inquiries concerning future policy on grants for construction or purchase of university research reactors should be directed to the National Science Foundation.

✓ Special Fellowships -- There are 51 institutions in 31 states participating in the AEC program for Special Fellowships in Science and Engineering. AEC officials hope that, as more institutions acquire specialized laboratory equipment and extend their graduate programs into the nuclear areas, the number of participating institutions will increase. In addition, the AEC has decided to extend all of its educational assistance programs through June 30, 1964.

✓ Special Facilities -- Erroneous reports circulated during the week that the AEC was planning a more extensive program for the provision of research buildings and facilities on university campuses. Officials in charge of the program state that no policy change is planned.

TECHNICAL TRENDS

□ The Navy is conducting a qualification testing program for paint vehicles based on unmodified silicone resins capable of withstanding weather and temperature extremes and exposure to deleterious fluids. For details write Director, Aeronautical Materials Laboratory, Naval Air Material Center, Philadelphia 12, Pa. Attn: XM-44-RAR. √√√ The Federal Government has decided to sponsor a series of "Science Fairs" in key Asian cities. Cooperation of industrial and research organizations will be invited. The program is to be coordinated by the National Science Foundation, Washington 25, D. C. √√√ The Procurement Office, Building 43, Kelly Air Force Base, Texas has details of proposed contracts for disposal of radioactive wastes at sea.

□ Details of research on the calibration of airplane camera lenses are available in STR 2519 from the National Bureau of Standards, Office of Technical Information, Washington 25, D. C. √√√ The Information Office, U. S. Atomic Energy Commission, Washington 25, D. C. has available Announcement C-226 detailing $1.5 million in grants to 113 educational institutions for purchase of nuclear laboratory equipment. √√√ Without any public announcement the Department of Commerce has cancelled publication of some 140 Russian abstract journals. Despite a clamor for more Soviet scientific information, the journals had an average of 15 subscribers. Attempts will now be made to publish selected abstracts in six categories. √√√ Wright Air Development Division, U. S. Air Force has awarded $139,248 to Douglas Aircraft Company for a Project SLOMAR (Space Logistics, Maintenance and Rescue) study program. Objective is a transport spacecraft to deliver food, water and other essentials to men in earth satellites.

□ Atomic Energy Commission will negotiate with Allis-Chalmers Manufacturing Company on plans to supply a 50,000 net electrical kilowatt, prototype nuclear power plant which would incorporate a boiling water reactor of improved engineering design. Bid price on the nuclear portion of the plant is $10,760,370, with the project contingent upon satisfactory arrangements with the cities of Los Angeles and Pasadena for joint operation. √√√ Propeller profile models are now being molded from epoxy resin at the Navy's Philadelphia Shipyard. The method replaces kirksite castings which require extensive and tedious precision machining. Weight reductions are considerable and savings are estimated at 50 to 60 percent. √√√ The Bell Aerosystems Company has turned over to the Navy for research its hydroskimmer, a ground effect machine with a hull of polyester resin reinforced with fiberglass. A large fan supplies lift, while an outboard motor propels the craft forward.

□ A new multi-polarized antenna developed by the Electronics Division of Chance Vought, Inc. will be installed aboard the first tracking vessel for the Pacific Missile Range. Polarization can be selected either through remote switching or automatically, saving much "down time" generally necessary to change antenna elements. √√√ Reports translated by the U. S. Government indicate Soviet development of an all-metal A-15 glider incorporating a "thermovisor" to assist the pilot in locating upward moving air currents. A so-called "remote pilot system" consists of a two-way radio set and a beacon which operate together with a ground radar transmitter. Coded signals are sent from the transmitter to the beacon -- enabling the ground operator to determine location, distance, altitude and speed. √√√ First test firing of the Minuteman at Cape Canaveral is scheduled for December 10. √√√ The Air Force says it has a specific operational requirement for a Mid-Range Ballistic Missile (MRBM) Weapon system, which has previously been referred to as the TM-X or TBM. √√√ The Army Aviation Center will use 15 new Cessna Model 180's to test the INTACT (Integrated Instrument Contact Primary Flight Training) concept under which student pilots learn both visual and instrument techniques at the same time.

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RESEARCH REQUIREMENTS

Here is a new listing of U. S. Government research and development requirements. Subscribers interested in these technical problems may write Service Department, Washington SCIENCE TRENDS, National Press Building, Washington 25, D. C.

You will be furnished with the official problem number and information on where to write for details.

- SOLAR CELL COATINGS: Interest is expressed in silicon solar cells which could operate at lower equilibrium temperatures and, hence, with higher conversion efficiency than present type cells. Investigation of optical coatings for solar cells other than silicon, such as gallium arsenide, may lead to a solution of this problem.

- ULTRA-HIGH PRESSURE: New means of producing ultra-high temperatures (other than by hydraulic means) are being sought. It is felt that in order to use the promise of materials produced at extreme pressures, procedures suitable for economic production of reasonably large units are necessary.

- AIRCRAFT BATTERIES: Today's aircraft batteries are generally either lightweight or long-life. One necessity is the development of high-output, long-life and lightweight batteries for use in aircraft.

- ION EXCHANGE FILTER: A requirement exists for the development of an improved ion exchange filter which will provide suitable water for all hospital uses by the Army in the field, without the requirements of steam stills.

- MEASURING ATMOSPHERIC TURBULENCE: The military believes that there is no convenient reliable method today for the measurement of atmospheric turbulence at scales and levels important in the use of field weapons. A new system is required so that wind measurements determined by standard methods can be relied upon.

- AEROSOL FORMATION CONCEPTS: New physical and chemical concepts which can result in the formation of aerosols are required. Breakup of a liquid or a solid into particles and dispersion in the air requires a minimum amount of energy, which can be calculated. Present methods are said to supply this energy by random and wasteful means. Techniques are required leading to the economical supply of energy to a system in such a way as to produce a dispersion of particles of controlled size in air -- with particles from sub-micron to the maximum size stable in freefall being of interest.

- AIR DROP RADIAC: A compact and reliable radiation measurement device which can be air-dropped and interrogated at will by radio or other means is required. The device would be used to permit field commanders to determine quickly the intensity of radiation at or near the site of a nuclear explosion.

RESEARCH CHECKLIST

□ MISSILE PAINT REMOVERS: The Army has developed new paint removers for stripping paint from missile component parts of aluminum and magnesium. Bench tests indicating improvement of 50 to 75 percent over the best conventional alkaline aluminum strippers were confirmed by field tests. The compositions are of the stable, single phase alkaline-organic type. In addition to speed, the new compositions make it easier to rinse away soapy films, and can establish conditions necessary for the retention of anodic coatings on magnesium parts.

(Details available through military channels or at 75 cents from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for Report CCL No. 78, Aberdeen Proving Ground, Md.)

□ ELECTROSTATIC PRINTING: Army Engineers are testing an experimental electrostatic printing machine which may eventually be capable of reproducing 2000 multicolor maps per hour. The device, built by Radio Corporation of America, reproduces maps directly from miniature separation transparencies and thereby eliminates platemaking requirements. The present unit is essentially a single color model. Multicolor units are not expected to be available for use before 1965.

(R&D reported by Technical Liaison Office, U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va.)

□ ALTIMETER STUDIES: A mid-1959 study by Airborne Instruments Laboratory, now publicly available, indicates the need for research on altimeters suitable for low altitude and flareout conditions in an all-weather landing system. It is concluded that quantized FM/CW techniques can meet present day requirements, and that non-quantized CW altimeters will probably be used more extensively for higher accuracy requirements of the future. The study, sponsored by the Federal Aviation Agency, indicates that the capabilities of pulse radar altimeters may prove attractive if further substantial improvement in radio devices is not feasible. The FAA was also advised that a sonic CW altimeter shows promise, but is not likely to be universally applicable. Sonic altimeters have not found favor in the past because of poor signal-to-noise characteristics.

(FAA Research Report No. 5791-17 available at $1.25 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

□ NEW CARTRIDGE CASING: The Army describes as "revolutionary" the development of a new cartridge case which is completely combustible when fired in a gun. The casing composition is classified and is designed primarily for use in tank guns. Ultimately it may be used in other Army weapons. The combustible case is up to ten times lighter than a conventional brass case, leading to improved storage, shipping and handling and less gun-crew fatigue. In addition, it will help solve two "nuisance problems" of tank firing -- the litter of hot spent cases on the tank fighting compartment floor, and the noxious gases released inside the turret after each firing.

(R&D at Picatinny Arsenal, Dover, New Jersey; Armour Research Foundation, Chicago, Illinois and Ballistics Research Laboratory, Aberdeen Proving Ground, Maryland in cooperation with private industry.)

PUBLICATION CHECKLIST

- ☐ RADIOISOTOPE INSTRUCTORS GUIDE, an outline of a study course prepared by Stanford Research Institute for the Atomic Energy Commission. Designed to train workers in industrial firms using radioisotopes. A companion instruction guide is available for workers employed in a radiation area. 75 cents each. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Instructor's Guide, Radioisotopes (66Z) and/or Instructor's Guide, Radiation Safety (67Z.)

- ☐ HEAT TREATMENT, IRON AND STEEL, a monograph designed to provide basic theoretical and practical principles involved in the heat treatment of iron and steel. 40 pages. 35 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. C 13.44:18.)

- ☐ AEC FINANCIAL REPORT, an interesting summary of the operations of the Atomic Energy Commission from a financial viewpoint. Covers operations over the past fiscal year and provides a ten-year summary of financial data. 46 pages. Single Copies Free. (Write Office of Public Information, U. S. Atomic Energy Commission, Washington 25, D. C. for Annual Financial Report, 1960.)

- ☐ HIGH SPEED COMMUNICATIONS EQUIPMENT, a comprehensive report prepared for the Federal Aviation Agency by Daystrom Systems, Inc., La Jolla, California in 1959 and now publicly available. Surveys the systems equipment field throughout much of the industry, covering such items as transceivers, buffers and controls, recording devices, on a company-by-company, machine-by-machine basis. 230 pages. $3.50. (Write OTS, U. S. Department of Commerce, Washington 25, D. C. for Report PB 161 858.)

- ☐ ROCKET MOTOR CASES, a May, 1960 report now publicly available. Surveys information on the welded fabrication of steel solid-propellant rocket-motor cases, including the long-range Polaris and Minuteman missiles. (Available to Government contractors, subcontractors and their suppliers from Defense Metals Information Center, Battelle Memorial Institute, Columbus 1, Ohio. Others may write OTS, U. S. Department of Commerce, Washington 25, D. C. for DMIC Memorandum 56. 28 pages. 50 cents.)

- ☐ MICROFILM APERTURE CARD SYSTEM, a detailed report on Air Force and industrial research, equipment and systems for the storage, reproduction and distribution of engineering drawings and associated data. The Aperture system, according to the report, combines the advantages of microfilm with the operational precision and speed of automatic tabulating equipment. (Available through military channels or at $3 from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for WADC Technical Report 59-746.)

- ☐ ARMS CONTROL, a Congressional reprint of a study by the National Planning Association on the topic "Strengthening the Government for Arms Control." 28 pages. Single Copies Free. (Write Senator Hubert Humphrey, U. S. Senate, Washington 25, D. C. for Senate Document 123.)

- ☐ NATIONAL SCIENCE ACADEMY, the text of hearings, testimony, statements on Congressional proposals for the establishment of a National Science Academy -- a technical West Point or Annapolis. 35 pages. Single Copies Free. (Write Committee on Science and Astronautics, New House Office Building, Washington 25, D. C. for Hearings, No. 14.)

- ☐ UNDERGROUND DIESEL EQUIPMENT, a description of U. S. Bureau of Mines research on mobile diesel powered equipment, with safety precautions on use underground in noncoal mines and tunnels. 87 pages. Single Copies Free. (Write U. S. Bureau of Mines, Publications-Distribution Section, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigation No. 5616.)

Ø SIGNAL CORPS

✓ LABORATORY PROCUREMENT

Support Office
U. S. Army Signal Supply Agency
Watson Area
Fort Monmouth, New Jersey

Interests - Auxiliary Equipment; Avionics; Basic Research; Combat Surveillance; Components; Electronic Countermeasures; Electronic Data Processing Systems; Ground Photography; Infrared-Ultraviolet; Materials (in communication equipment); Meteorological Instrumentation; Radar; Radio Communications; Radio Direction Finding; Radiological Detection Instruments; Sensory Devices; Sound and Light; Television; Testing Equipment; and Wire Communications.

Ø CHEMICAL CORPS

✓ ARMY CHEMICAL CENTER PROCUREMENT AGENCY

Army Chemical Center, Maryland

Interests - Air Sampling; Electronics and Instrumentation; Engineering of Protective Devices; Investigation of Chemical and Medical Properties of Toxic Compounds; Munitions Engineering; and Processing and Production of Chemical Materials.

✓ BIOLOGICAL WARFARE LABORATORIES

Fort Detrick, Maryland

Interests - Air Sampling; Electronics and Instrumentation; Investigations of Biological and Medical Properties of Infectious Agents; Investigations of Vaccines and Antitoxoids; Munitions Engineering; and Processing and Production of Biological Materials.

✓ DUGWAY PROVING GROUND

Dugway, Utah

Interests - Air Sampling; Chemical and Biological Munitions Proof Testing; Cloud Physics; Ecology and Epidemiology; and Electronics and Instrumentation.

Ø ARMY MEDICAL SERVICE

✓ U. S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND

Main Navy Building
Washington 25, D. C.

Interests - Basic Research in Medical Sciences; Bioastronautics; Biophysics; Blood, Blood Derivatives, and Blood Substitutes; Dentistry; Diseases of Animals Transmissible to Man; Internal Medicine and Metabolism; Medical Supplies and Equipment; Neuropsychiatry and Stress; Preventive Medicine; and Traumatic Surgery, Shock and Burns.

✓ ARMED SERVICES MEDICAL MATERIEL COORDINATION COMMITTEE

23rd and E Streets, N. W.
Washington 25, D. C.

Interests - Dental Equipment and Supplies; Field Equipment; Hospital Equipment and Supplies; Laboratory Equipment and Supplies; Medical Sets, Kits, and Outfits; Optician's Equipment, Supplies, and Instruments; Surgical Dressing Materials; Surgical Instruments, Equipment, and Supplies; and X-Ray Equipment and Supplies.

HUMAN FACTORS RESEARCH

Principal interests of Human factors research concern MAN other than medical sciences, and include selection, classification, utilization, assignment, training, motivation, leadership, training devices and simulators, psychological warfare, guerrilla activities, and man-machine compatibility.

The Adjutant General Department of the Army Washington 25, D. C.	Research in the areas of personnel selection, classification, utilization, and assignment.
Human Resources Research Office 2013 G Street, N. W. Washington 25, D. C.	Research in the areas of personnel training, motivation, and leadership.
Army Participation Group Naval Training Devices Center Port Washington Long Island, New York	Research in the area of training devices and simulators.
Special Operations Research Office 4501 Massachusetts Avenue, N. W. Washington 16, D. C.	Research in areas of psychological warfare and guerrilla activities.
Chief, Research and Development Department of the Army Washington 25, D. C. Attn: Chief, Human Factors Research Division	Inquiries regarding Human Engineering and all other Army research activities in the Human Factors Field.

OPERATIONS RESEARCH

The Army makes extensive use of the science of operations research.

Operations Research Office 6935 Arlington Road Bethesda, Maryland Washington 14, D. C.	Operations research in Army Tactical, logistical, intelligence and organizational problems and systems analysis.
Chief, Research & Development The Pentagon Department of the Army Washington 25, D. C.	Other Army research activities in the Operations Research Field.
Army Map Service 6500 Brooks Lane, N. W. Washington 25, D. C.	Cartography, geodesy and photogrammetry.

(End of Army Section)